Carnochan (J. M.)

EXSECTION

Dr. J. Riley

OF THE

Comp. 5

ENTIRE ULNA,

BY

J. M. CARNOCHAN, M. D.,

PROFESSOR OF SURGERY IN THE NEW YORK MEDICAL COLLEGE, CHIEF SURGEON TO THE STATE EMIGRANTS' HOSPITAL, ETC.,

WITH A PLATE.

[From the American Medical Monthly, March, 1854.]

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1854.

DR CARNOCHAN'S CASE OF EXSECTION OF THE ENTIRE ULNA.

DISEASED RIGHT ULNA,- EXACT SIZE,

FIG. 1.

Shews cleaned enlarged oval & round foramina & areolar & mammillated formations, on the surface of the bone.

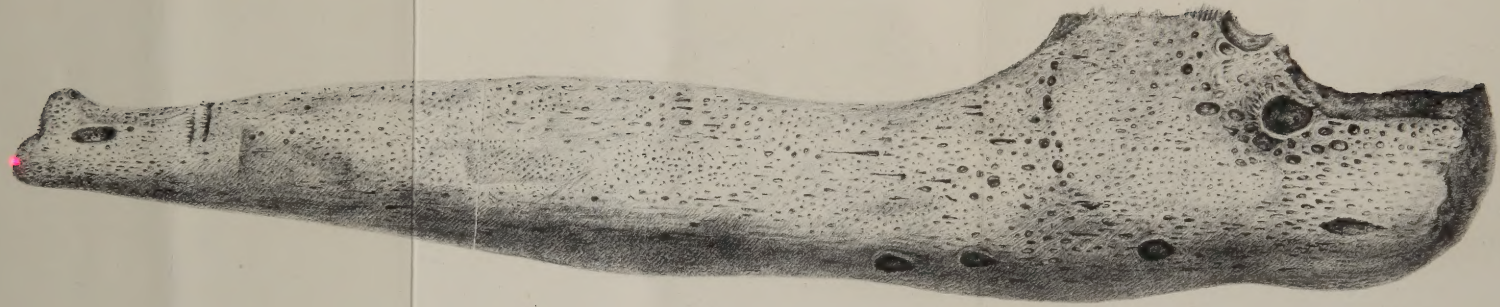
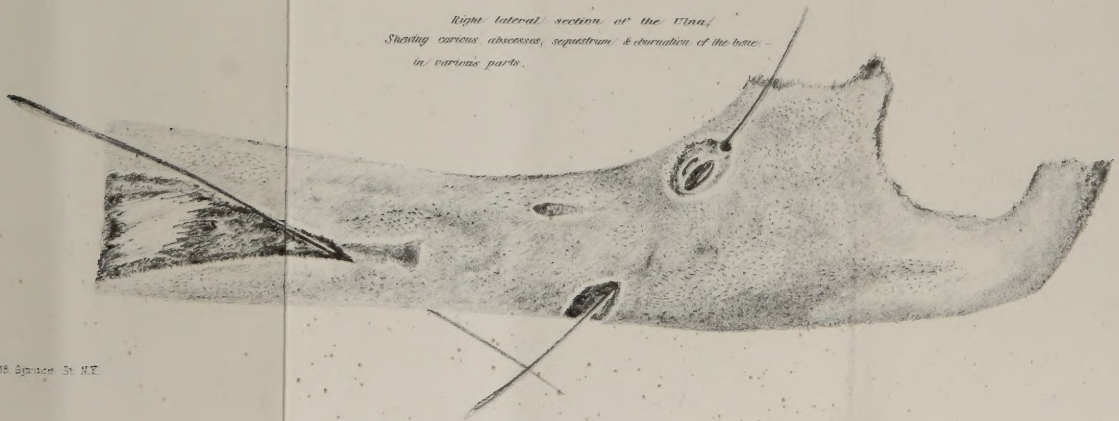


FIG. 2.

Right lateral section of the Ulna, Shewing curious abscesses, sequestrum & eburnation of the bone in various parts.



C. Currier's lith. 28 Spruce St. N.Y.

J. Plunkett. Delt.

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Modern surgery is chiefly indebted for the revival of the operation for the exsection, partial or complete, of the long bones, to Moreau, Percy, Champion, Pelletan, and Dupuytren. Large bones of this class have been exsected in their contiguities: thus, Butts, of Virginia, exsected the entire radius; the fibula has been removed from one extremity to the other; and even the entire lower jaw has been at once removed, at both temporo-maxillary articulations, with satisfactory results. No instance, however, has been, as yet, recorded of exsection of the entire ulna. The following case shows that the entire ulna can be removed, and the functions of the upper extremity be retained, nearly in their original perfection.

Case.—P. Cavanagh, a native of Ireland, aged 30, of sanguineous temperament, of small stature, strumous aspect, without syphilitic taint, a shoemaker by trade, while splitting wood with a heavy axe, sprained his arm so severely that, as he expresses it, the sinews seemed to give way. During the night following the accident, he was awakened by intense pain about the region of the wrist joint. This was speedily succeeded by swelling of the upper and forearm, as high up as the humero-scapular articulation. In this condition, he consulted a physician, who prescribed an anodyne liniment, to be applied to the arm. The application was used for five weeks without abatement of the pain. Fomentations of hop leaves were then resorted to. These failing to bring relief, and the malady still progressing, the patient sought the advice of Dr. Webster, of Geneva, who made along the arm two deep incisions, which were followed by a slight discharge of pus and much blood. Cataplasms were then used for about eight weeks, with no relief to the pain or diminution of the tumefaction. In the month of July, 1852, Cavanagh entered as a patient the surgical division of the State Emigrants' Hospital.

At the time of his entrance he was much enfeebled and emaciated; the presence of irritative fever showed that the constitution was sympathizing

with the local disease; the hand, forearm, arm, and shoulder presented one dense, hard, tumefied, and shapeless mass, of a purple hue, and extremely sensitive when handled: the pain was unremitting, being more severe by night than by day; the circumference of the diseased forearm was three times greater than that of the corresponding portion of the healthy arm; and the density of the tissues was such, that, in connection with the wan and emaciated aspect of the patient and the purple hue of the integuments, there was reason to conjecture that the disease was one of malignant character. A lotion of acetate of lead and tincture of opium was ordered to be kept on the arm, which was also to be enveloped in oil-silk. Quinia, porter, and good diet were likewise ordered.

August 1st, 1852. Three weeks having elapsed, and the tension and swelling still remaining unabated, free and deep incisions were made through the tissues of the forearm; but the relief obtained by this operation was but momentary. The arm was now kept enveloped in a flax-seed cataplasm, with which was incorporated some extract of stramonium. During the months of September and October, the constitutional treatment was but little varied. Iod. ferri, and iod. potassii were at times substituted for the quinia; an anodyne draught of morphia was regularly given at bed-time. The topical applications consisted alternately of cataplasms, anodyne liniments, anodyne fomentations, of *eau sedative*, of extract of stramonium. While this treatment gave no relief to the pain, several abscesses had formed along the ulnar region of the forearm, and these openings left sinuses leading to the surface of the ulna; which, by means of the probe, could be felt, denuded of its periosteum.

The diagnosis now became more precise, and his card was ordered to be marked "Ostitis, caries and necrosis of the ulna, possibly, also, of the radius." The general tumefaction, at this period of the disease, rendered it impossible to ascertain that one bone alone was affected. The patient deriving no benefit from the use of the various medicamental means which had been resorted to, was recommended to remove from the Hospital to the country, for a change of air, and, at the same time, was directed to use tonic remedies and a generous diet. The patient consequently took his discharge from the Hospital, Dec. 1st, 1852.

On the 18th May, 1853, he was again admitted, having, in the interval, followed the instructions he had received. The shoulder and upper arm were now found to have resumed their normal appearance and size; but the elbow joint was very much enlarged, and almost incapable of motion. The forearm was still dense and hard, and was, moreover, much increased in size, presenting along its ulnar aspect a purplish hue, with various openings and sinuses, from which, at times, small portions of dead bone had been eliminated during the patient's absence from the Hospital. The wrist joint

was also limited in its movements, and supination and pronation could not be performed. The general health was somewhat improved, but the constitution still showed signs of participation in the local malady, and a dull and aching pain continued to extend along the arm towards the axilla.

The indications of treatment, now, were to keep up and improve the general tone of the system, and to use topically anodyne applications, in conjunction with iodurettted preparations. To this end, during the following seven months, the constitution was supported by the internal exhibition of quinia, carb. ferri. precip., iodide of potassium, syr. iodide of iron, sarsaparilla, infusion of prunus Virginiana, wine, porter, generous diet, &c.; while locally, anodyne and iodurettted cataplasms, fomentations, unguents, and the warm bath, were sedulously employed. But, from this treatment, no perceptible amelioration was obtained; the arm was still much tumefied and hard; the sinuses remained unclosed, discharging daily considerable quantities of purulent material, in which, at times, were found minute portions of diseased bone. At this time, also, Jan. 1st, 1854, the ulna could be more distinctly traced, and felt to be enormously enlarged, apparently through its whole extent; but there was good reason to infer, as no sinus could be traced to the surface of the *radius*, that this latter bone was entirely sound.

Medicamental and dietetic treatment had now been used for nearly two years; the arm was still useless, and a painful incumbrance; and the ultimate cure of the malady appeared to be beyond the resources of the medicinal art. The patient was becoming impatient, and anxious to obtain relief. The resources of operative surgery seemed now to offer the only prospect of attaining a serviceable result; and, as a point of practice, the alternative presented itself of amputation of the arm above the elbow, or of exsection of the entire diseased bone. From some recent investigations which I had been prosecuting upon the lower animals, I had convinced myself that the entire ulna, although forming an important part of the elbow joint, could be removed without materially impairing either the strength of the limb or freedom of its movements. Accordingly, I gave the preference to exsection of the bone, rather than to the severe mutilation of amputation of the arm, and performed the operation on the 14th January last.

Operation.—The patient was brought into the amphitheatre, and placed supine upon the operating-table. The assistants were arranged so as to maintain firmly the trunk and lower extremities, and be in readiness to hand the instruments and to sponge the wound. Chloroform was cautiously administered. While under the full influence of the anæsthetic, the position of the patient was changed so that he lay partly on the left side.

One assistant held and supported the upper arm of the diseased limb, compressing at the same time the humeral artery; another, seizing the hand

and wrist, rotated inwards the limb from the shoulder-joint, and carried the pronation of the forearm so far as to cause the palm of the hand to look directly outwards. The elbow-joint was now slightly flexed, and the hand elevated. This twisted position of the ulna upon the radius placed the ulna upon the posterior and outer aspect of the forearm, and rendered it more easily accessible.

The limb thus placed, the assistants maintaining the arm and forearm steadily, standing upon the right side of the patient and placing the fingers of the left hand upon the integuments of the forearm towards the elbow, with a strong, straight, sharp-pointed bistoury, I made an incision along the posterior and inner aspect of the ulna, commencing at the lower part of its superior third and extending downwards to a point over the extremity of the styloid process. This divided the tegumentary layers and fascia, which were found dense, matted, and infiltrated. The tendon of the *extensor carpi ulnaris* was pulled back, and the bone exposed. This was found rough, enormously enlarged, and presenting numerous oval foramina and several cloacæ, which communicated externally through the integuments. It was now apparent that the bone must be disarticulated. To effect this at the carpo-ulnar articulation, a transverse incision, about an inch long, parting from the lower extremity of the first incision, was made across the back of the wrist. The superficial tissues were here reflected, and the tendon of the *extensor carpi ulnaris* was carefully detached from its groove on the lower part of the ulna. The dissection was now carried along the anterior surface of the lower portion of the ulna, and the soft parts were detached from the bone as far as the interosseous ligament, the ulnar artery and nerve being carefully avoided. The soft parts were now detached from the posterior surface of the ulna, avoiding injury to the extensor tendons. An attempt was then made to pass a chain-saw around the ulna through the interosseous space opposite the lower part of the middle third. This was found impossible, on account of the approximation of the enlarged ulna to the radius, and the almost complete obliteration of the interosseous space. To divide the bone at this point, a small convex-edged saw was used. The bone thus divided, the interosseous ligament was detached downwards, and the lower fragment of the ulna was disarticulated from its inferior attachments to the radius, fibro-cartilage and the carpus.

It now remained to isolate and detach the upper fragment. The first incision was now prolonged upwards along the posterior surface of the ulna, so as to end at the upper part of the olecranon, opposite its outer edge. To this a terminal incision was joined, which extended transversely across the back of the elbow-joint as far as the inner margin of the ulna. The soft tissues were now dissected from the bone upon its posterior and anterior aspects, as far as the interosseous ligament and as high up as the insertion

of the *brachialis internus* muscle. The bone was next seized and pulled from the radius, and a knife, curved flatwise, was passed close upon its interosseal margin, and grazing the bone, the interosseal membrane was divided upwards, the soft parts being held apart, and the interosseal and ulnar arteries protected.

The elbow-joint was now flexed, and opened behind by entering the bistoury close to the inner edge of the olecranon, and the attachment of the triceps extensor was next divided by cutting directly outwards. The ulnar nerve was now found, and hooked aside until farther dissection of the soft tissues was effected from the inner aspect of the joint and the upper part of the bone. The lateral ligament was next divided. The bone still remained firmly attached, chiefly by the coronary ligament and the insertion of the *brachialis anticus*. The ulna was carried backwards so as to make this muscle tense, and by carefully grazing the coronoid process with the knife the tendon was detached. Some difficulty was here presented in avoiding the humeral artery, which lay in close proximity to the enlarged coronoid process. The bistoury was now passed between the ulna and radius, and the coronary ligament divided. A few remaining fibres were divided, and the bone was completely detached.

During the operation there was a considerable flow of venous hemorrhage, which soon ceased upon removal of compression from the upper arm. The arterial bleeding was arrested by torsion of a few arteries around the elbow-joint. The operation was performed in the presence of many pupils and professional gentlemen; and I was ably assisted during its different steps by Dr. Glück and Dr. Melville, of this city, and by Drs. Hensley, Gould, Harris, and Thomas, the Resident Assistant Surgical Staff of the Hospital.

Progress of Union.—After the operation, the wound was cleansed of coagula, and the edges brought together by ten points of interrupted suture. The limb, after the dressing and bandage were applied, was placed, prone and slightly flexed, upon a well padded splint, and fixed to this by circular strips of bandage. The patient recovered slowly from the influence of the chloroform, the pulse remaining below 50 for some hours; anodyne ordered at bed-time. Next day, Jan. 15th, the pulse 100—full and regular; oozing of blood has occurred to some extent; during the night, patient has been restless, and has suffered much pain in the arm. Sol. sulph. morph. at bed-time.

Jan. 16th. Pulse 100—not so full or strong; no more oozing of blood has occurred, and the patient feels more comfortable, having slept, and suffered but little during the night. The first dressing removed in the afternoon: for four inches above the wrist joint, the wound seems to be uniting by first intention.

Jan. 17th. Pulse 83—regular; general condition good. Ol. ricini ordered. The wound dressed; suppuration profuse. The lips of the wound have an unhealthy aspect; four of the sutures come away. Anodyne in the evening. The patient is ordered to commence in the morning with solution of sulphate of quinia.

Jan. 18th. Patient has slept badly, having suffered much pain, during the night, along the arm; pulse 80. Dressed the wound, which has assumed a better appearance; suppuration less, but little adhesion. Beef-tea ordered.

Jan 19. Pulse 90; patient has slept tolerably well. Wound dressed; discharge of pus decreasing, and union progressing from the wrist upwards; free discharge of synovial fluid from the elbow joint, upon removal of the dressing.

Jan. 20th. Pulse 84. Wound dressed; favorable progress. Full diet allowed. Quinine continued. No undue inflammatory action at either articulation. Arm still kept in the same position.

21st. Patient has suffered much pain at the elbow joint during the night. In the afternoon, wound dressed; doing well; there is free motion at both elbow and wrist joints; discharge of synovia still coming from the elbow joint.

Jan. 22d. Everything going on well. Wound dressed; but little discharge, except at the several tegumentary orifices which existed between the wrist and elbow before the removal of the bone; but little synovial fluid coming from the joint.

Jan. 25th. General condition of the patient excellent; pulse 80, and natural. Appetite good. Only slight oozing of synovia from the elbow; no pain. Splint upon which the arm rested in a state of pronation, dispensed with; forearm now bent at a right angle, and held in a position between supination and pronation, while a light, well-padded splint, extending from the elbow to the extremity of the fingers, is placed and bandaged along the front thereof, to support the radius; limb, thus adjusted, supported by a sling passed around the neck. Patient allowed to sit up.

Jan. 29th. First splint removed, and the arm, which had been maintained fixed for the last four days, adjusted, and bandaged to another splint, jointed and formed of two pieces, one for the upper arm, and another for the forearm; the joint being opposite the elbow, in front: by this arrangement the forearm still kept in semi-pronation, and radius supported, while, by regulating the angle of the splint, by a mechanism for that purpose, the forearm can be gently and gradually extended.

Feb. 5th. During the use of both splints, dressings carefully attended to, by removal and re-adjustment at suitable intervals. To-day, upon removal of the splints and dressing, healing process of the wound found to be

entirely completed; the tissues about the wrists and elbow joints being entirely consolidated, and free motion at both articulations possible by the patient himself, without any assistance.

Feb. 10th. Limb still supported by a light bandage, and by the last splint, for the purpose of allowing the tissues along the line of the inner aspect of the forearm to become further consolidated. Health of the patient is now good; he walks about like a well person. He is still upon tonic treatment, and is allowed generous diet.

Feb. 15th. Removed the splint; patient allowed to use his arm. General health entirely restored.

Feb. 18th. Five weeks after the operation, discharged from the Hospital cured.

Appearance of the Arm; and its Functions.—With the exception of a depression, and the cicatrix along the ulnar aspect of the forearm, there is no deformity of the limb.

The functions of the arm are preserved in a remarkable degree of perfection. The power of prehension is unimpaired; and flexion and extension at both the elbow joint and at the wrist joint can be performed with facility —supination and pronation can also be effected—abduction and adduction at the wrist joint can be performed; as also flexion and extension of the fingers, as before the operation; sensation and nutrition are as perfect as on the arm and hand of the opposite side.

None of the large nerves or arteries were injured during the exsection of the bone, and the muscular tissue was carefully preserved from the action of the bistoury, with the exception of the cubital origin and insertion of those muscles which are attached to the upper portion of the ulna. These had to be divided during the detachment of this portion of the ulna.

Flexion at the elbow joint is chiefly effected by the *biceps flexor*, which is inserted into the tubercle of the radius; but the humeral origin of the other flexor muscles—such as the *flexor sublimis digitorum communis*, the *flexor carpi ulnaris*, the *palmaris longus*, the *flexor carpi radialis*, and the *pronator radii teres*—remaining uninjured, they also serve as auxiliaries in this function.

The *triceps extensor* and *anconœus* were, necessarily, entirely detached during the operation; but extension of the forearm is sufficiently performed by the action of the *extensores carpi radialis longus et brevis;* by the *extensor communis digitorum*, the *extensor minimi digiti*, and by the *extensor carpi ulnaris;* all of which muscles pass from the external condyle of the humerus, to be inserted on the posterior surface of different metacarpal and phalangeal bones of the hand.

Flexion of the wrist joint is effected by *flexor carpi radialis*, *palmaris*

longus, flexor carpi ulnaris ; extension, by the *extensores carpi radialis* and the *extensor carpi ulnaris.* Adduction, also, is effected by the *extensor carpi ulnaris ;* while abduction results from the action of the *extensores carpi radialis.*

Flexion of the fingers is chiefly effected by the *flexor sublimis digitorum communis*, and the extending function of the phalanges results mainly from the action of the *extensor communis digitorum.*

Pathological condition of the bone.—The diseased ulna is delineated in the plate, Fig. 1, and presents all the characteristic manifestations of prolonged inflammatory action of a high grade. The bone is enormously expanded from one extremity to the other—at the base of the coronoid process it measures in circumference 5½ inches; and its weight is 8 oz., minus 20 grs., the weight of a recent, healthy, adult ulna varying from 2½ to 3 oz.

Bony vegetations have assumed the acicular form on the radial aspect of the bone, on a line with the attachment of the interosseous ligament, as far down as the junction of the middle with the lower third—the acicular formations also prevail on and below the coronoid process. At all other points around the upper extremity of the bone, irregular mammillated appearances exist, with innumerable enlarged, round, and oval foramina. These enlarged foramina, in conjunction with the hypertrophied condition of the bone, are characteristic signs of protracted inflammatory action, as was long ago demonstrated by the Goodsirs, of Edinburgh.

Along the inner and posterior aspect of the bone exist some eight *cloacæ*, five of which are in the upper third of the bone: two in the middle third; and one near the styloid process. One of these *cloacæ*, situated between the coronoid and olecranon processes, communicates with the interior of the elbow joint; while another, situated at the lower part of the bone, communicates with the ulno-carpal articulation.

The other *cloacæ* pass deeply into the interior of the bone, ramifying extensively, like sinuses, in different directions along the inner texture; some of the sinuses containing portions of bone in a state of necrosis, and more or less detached. From these *cloacæ*, which opened externally upon the integumentary surface, large quantities of purulent fluid, mixed at times with portions of dead bone were discharged.

At the middle third, the circumference of the bone, by measurement, is four inches, being ⅝ in. larger than the shaft of an adult femur. At this part, also, the round and oval foramina are abundant.

The lower third of the bone is also extensively hypertrophied, being, at its upper part, 3⅜ inches, while, at the base of the styloid process, the circumference is 2⅝ inches.

The section of the bone, as represented in the plate, Fig. 2, shows the

appearance of the central portions. Here the influence of high inflammatory action, and its consequences, carious ulceration, necrosis, and eburnation, are plainly manifested. The greater part of the interior of the bone is exceedingly dense and compact. The surface of the osseous section is in some parts tinted of a dark purple hue; at other parts it is whitish and dense, like ivory, blastema having been here thrown out so as to obliterate the spongy structure, the Haversian canals, the lacunæ, and canaliculi. The right lateral half of the section [as seen in fig. 2] also shows the presence of two carious abscesses in the interior of the bone, which communicate externally with cloacæ and the integuments. In one of these abscesses a piece of sequestrum is situated, partly detached. Vide plate, Figs. 1 and 2.

20th Feb'y, 766 Broadway.